

Cross Cutting & Related Technologies: *Remotely Piloted Vehicles*

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ERAST UAV Platforms

Perseus B

Centurion

Pathfinder Plus

Altus

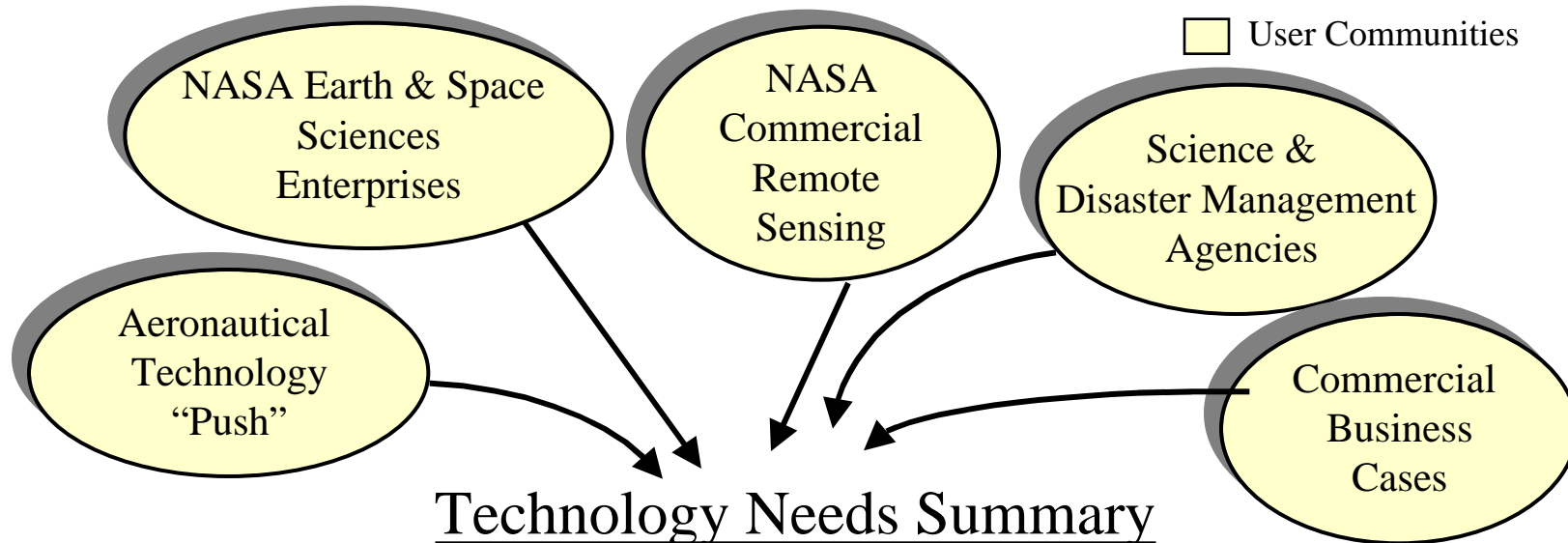
Demonstrator-2

Helios

Alliance I

APEX

Customers & Customer Requirements



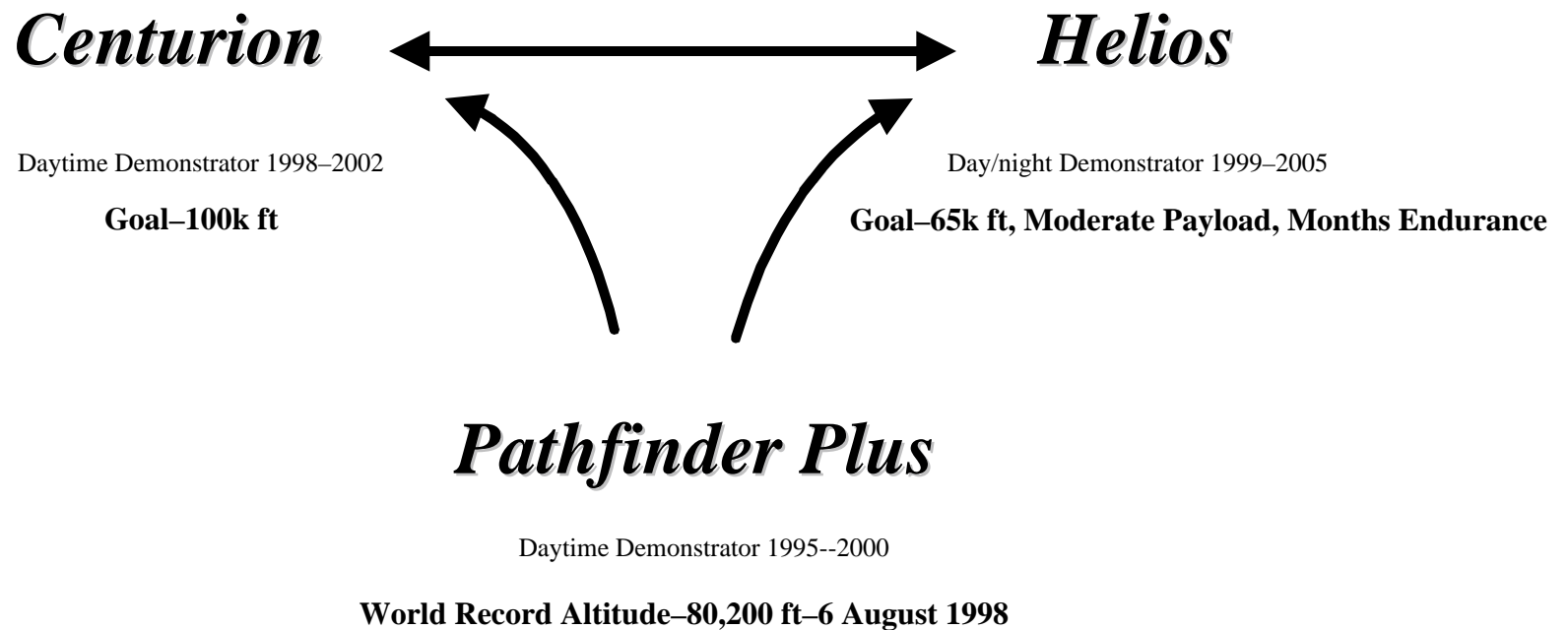
- Extreme Duration, High Altitude Solar Electric UAV
 - >100 kg payload, 65-100k ft altitude (months on-station)
 - <\$3M unit cost and <\$500/hour operations cost
- Conventionally Powered, High Altitude UAV Science Testbed or Commercial Mission Prototype
 - >300 kg payload, 65k ft altitude, >48 Hours Endurance
 - >300 kg payload, 85k ft altitude, >24 Hours Endurance
 - <\$5M unit cost and <\$750/hour operations cost

UAV Technologies

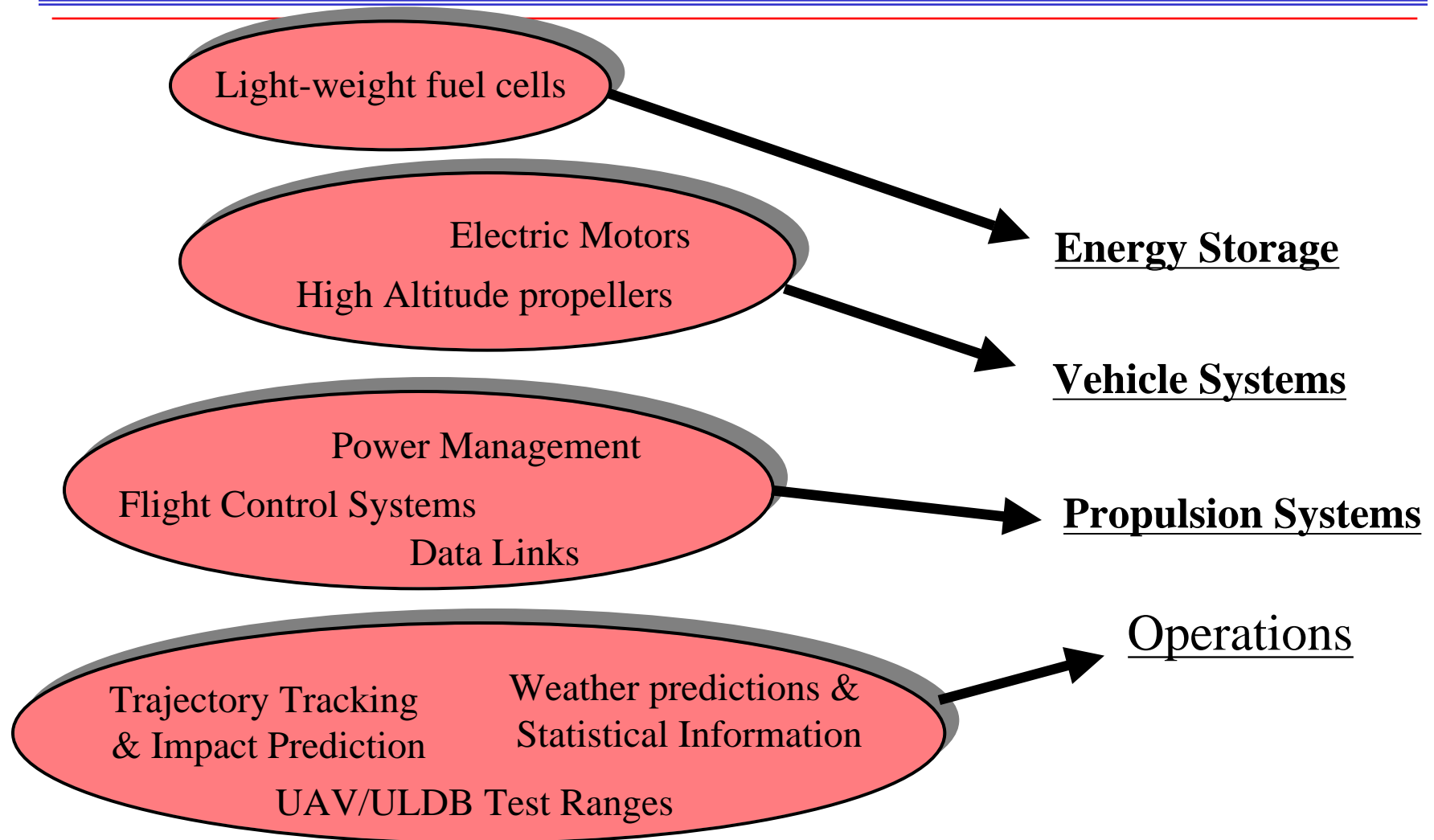
- **Propulsion**
 - Conventional–spark piston engine
 - Turbomachinery
 - Engine cooling
 - Solar-electric
 - Photovoltaics
 - Propellers
 - Battery
- **Structures and materials**
 - Composites (including boron)
- **Actuators**
- **Digital electronics**
 - Miniature, high performance
 - EMI/arcing
- **Flight management**
 - Redundant flight control
 - Reliable flight control sensors
- **Heat rejection**
 - Exchangers
- **Energy storage**
 - Regenerative fuel cells/electrolyzers
 - Rechargeable batteries
- **Command, control, communications**
 - Reliable, efficient
 - Satcom
 - Payload interfaces
- **Operations**
 - Efficient, low cost
- **Computer models and simulations**
- **Integrated sensors**

Extreme operating conditions—low Reynold's number, speed, temperatures and pressure
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Extreme Duration and Altitude Solar-Powered Technology



Cross-Cutting Technologies -UAVs & ULDBs



Operational Requirements of UAVs for the 21st Century

- Operation in National/International airspace
- Over-the-Horizon (OTH) communications
- “See-Detect/Avoidance” capability
- Certification criteria for Vehicles & Operators
- Safe, economical & reliable operations in a global environment

UAV Test Ranges

- UAVs require large areas for long periods of time for testing
- The Pacific Missile Range Facility in Kauai has proved to be a nearly ideal location for such testing
 - Large military airbase with facilities
 - Unobstructed airspace with cooperative FAA participation
 - Logistics support and telecom infrastructure in “austere” location
 - Local people easily trained to augment test operations
 - High tech support for test missions
 - Ideal science collection environment in the islands

